

5. The set of files of claim 4 wherein said shank has a diameter equal to approximately 95% of the diameter of the largest flute.

6. The set of files of claim 4 further including a shank guide which is spaced along the shank from the largest diameter flute by a distance which allows a chip space for tooth dust to collect during filing procedures.

7. The set of files of claim 1 wherein the tip of each file is smoothly rounded and devoid of cutting edges.

8. The set of files of claim 7 wherein the tip has a diameter which is slightly smaller than the diameter of the smallest diameter flute.

9. The set of files of claim 8 further including a second transition section between the tip and the flute portion which includes a pair of lands continuing from the smallest diameter flute to the tip.

10. The set of files of claim 1 wherein the flute portion of each file includes a plurality of flutes, each provided with cutting edges about the periphery of the file, said cutting edges diminishing in diameter and increasing in pitch and sharpness with distance from the largest diameter flute.

11. The set of files of claim 1 wherein each file of said set comprises a Hedstrom-type file with the cutting edges dulled along one side of the file and wherein the lengths of the flute portions vary inversely with the degree of file taper.

12. The set of files of claim 1 wherein each file of said set comprises a K-type file with the cutting edges dulled along one side of the file and wherein the lengths of the flute portions vary inversely with the degree of file taper.

13. The set of files of claim 1 wherein each file of said set comprises a Hedstrom-type file with the cutting edges dulled along one side of the file and wherein the lengths of the flute portions vary inversely with the diameter of the file tip.

14. The set of files of claim 1 wherein each file of said set has a preselected curve in a region of the flute portion near the tip which is set in the file during fabrication.

15. The set of files of claim 14 wherein each file of said set is fabricated of a nickel-titanium alloy.

16. The set of files of claim 15 wherein said alloy is Nitinol™.

17. A set of endodontic files for use in preparing root canals in teeth wherein the files vary in taper, one from another, each file comprising:

a shank varying in diameter from every other file in said set;

a tip varying in diameter from every other file in said set; and

a flute portion which extends between the tip and the shank, the flute portions of all files in said set being the same length;

wherein each of said files having a greater taper than another one of the files in said set has a larger diameter tip and a larger diameter shank than said other file.

18. The set of files of claim 17 wherein the taper varies from 0.01 mm/mm for the smallest diameter file to 0.05 mm/mm for the largest diameter file in said set.

19. The set of files of claim 18 wherein the variation in taper from file to file is 0.01 mm/mm.

20. The set of files of claim 17 wherein the variation in shank diameter from file to file is 0.185 mm.

21. The set of files of claim 17 wherein the length of the flute portion of each file of said set is 16 mm.

22. The set of files of files of claim 17 wherein the variation in tip diameter from file to file is 0.025 mm.

23. The set of files of claim 17 wherein a first file of said set has a tip diameter of 0.075 mm, a shank diameter of 0.235 mm, and a taper of 0.01 mm/mm.

24. The set of files of claim 17 wherein a second file of said set has a tip diameter of 0.1 mm and a shank diameter of 0.420 mm, and a taper of 0.02 mm/mm.

25. The set of files of claim 17 wherein a third file of said set has a tip diameter of 0.125 mm, a shank diameter of 0.605 mm, and a taper of 0.03 mm/mm.

26. The set of files of claim 17 wherein a fourth file of said set has a tip diameter of 0.15 mm, a shank diameter of 0.790 mm, and a taper of 0.04 mm/mm.

27. The set of files of claim 17 wherein a fifth file of said set has a tip diameter of 0.175 mm, a shank diameter of 0.975 mm, and a taper of 0.05 mm/mm.

28. The set of files of claim 17 wherein the shank of each file has a proximal end, remote from said flute portion, which is embedded in a handle configured to facilitate manipulation of the associated file.

29. The set of files of claim 28 wherein each file handle is pear-shaped and configured to provide an enhanced gripping area to facilitate the application of torque to the file in combination with apically directed force.

30. The set of files of claim 29 wherein the handle of each file is shaped with planar proximal and distal ends oriented transversely to the longitudinal axis of the file.

31. The set of files of claim 30 wherein the handle of each file comprises a smooth curved surface portion extending from the distal end to a maximum diameter and a scored section tapering from the plane of maximum diameter to said proximal end of said handle.

32. The set of files of claim 31 wherein the scored section of each file handle comprises 70% to 85% of the length of the handle.

33. The set of files of claim 32 wherein the scored section of each handle is 80% of the length of the handle.

34. The set of files of claim 33 wherein the handle of each file is 10 mm in overall length and the length of the scored section is 8 mm.

35. The set of files of claim 31 wherein the scored section of each file handle comprises a plurality of longitudinally directed grooves oriented side-by-side about the periphery of the handle, each of said grooves tapering slightly in width from the plane of maximum diameter to the proximal end of the handle.

36. The set of files of claim 35 wherein each of said grooves comprises a pair of beveled sides intersecting at the bottom of the groove.

* * * * *

37. An endodontic file having the capability of developing a predefined shape throughout the full length of the root canal of a tooth, said file having dimensions of diameter and length of its cutting portion matching a particular tooth root canal; said file comprising:

a shank;

a tip remote from said shank and having a diameter corresponding to the diameter of the terminus of said predefined shape of said root canal;

a flute portion extending between said shank and said tip and having a taper which is greater than the standard ISO file taper, said flute portion having at least one spiral cutting edge throughout its length;

said shank having a diameter determined by the diameter of the tip, the taper of the flute portion, and the length of the flute portion.

38. The file of claim 37 wherein said flute portion having said at least one spiral cutting edge varies in pitch along its length.

39. The file of claim 38 wherein the ratio of flute pitch adjacent the shank to flute pitch at the tip is four.

40. The file of claim 38 wherein the ratio of flute pitch at any point along the flute portion to flute pitch at the tip diminishes linearly with distance from the shank along the

flute portion.

41. The file of claim 37 wherein said flute portion having said at least one spiral cutting edge varies in relative sharpness along its length.

42. The file of claim 41 wherein said at least one spiral cutting edge is sharpest at the end next to said shank and dullest in the vicinity of the file tip.

43. The file of claim 37 wherein said flute portion comprises a plurality of angled flutes throughout its length.

44. The file of claim 43 wherein the angle of the individual flutes relative to the axis of the shank varies along the length of the flute portion.

45. The file of claim 44 wherein the angle of the flutes adjacent the shank is less than the angle of the flutes in the vicinity of the tip.

46. The file of claim 37 wherein at least a portion of the material of the file is a nickel-titanium alloy.

47. The file of claim 46 wherein the region of the flute portion in the vicinity of the tip is made of nickel-titanium alloy.

48. The file of claim 47 wherein said file is treated to establish a permanent curvature in said nickel-titanium portion adjacent the tip to enable the file to penetrate curved apical regions of the root canal more readily.

49. The file of claim 43 wherein the shank has a slightly smaller diameter than the diameter of the flute nearest the shank in order to avoid binding of the file shank in a root canal.

50. The file of claim 49 wherein the diameter of the shank is about 5% less than the diameter of the flute adjacent the shank.

51. The file of claim 49 further including a pair of transitional lands extending from the flute adjacent the shank to the shank itself in order to better guide the file in the root canal.

52. The file of claim 37 wherein said flute portion is provided with three spiral cutting edges throughout its length which define bridging surfaces between adjacent cutting edges, said cutting edges being equally displaced about the periphery of the flute portion and each bridging surface between adjacent cutting edges having a general S-shape when viewed in cross section.

53. The file of claim 37 wherein said flute portion is provided with three spiral cutting edges throughout its length, the

cross section of said flute portion being in the shape of an equilateral triangle.

54. The file of claim 37 wherein said flute portion is provided with six spiral cutting edges throughout its length, the cross section of said flute portion being hexagonal.

55. The file of claim 37 wherein the flute portion has three spiral cutting edges throughout its length equally displaced about the circumference of the flute portion which define bridging surfaces between adjacent cutting edges, wherein the bridging surfaces between adjacent cutting edges are concave.

56. The file of claim 37 wherein the file tip is smooth and devoid of cutting edges.

57. The file of claim 38 wherein said flute portion having said at least one spiral cutting edge varying in pitch along its length also varies in relative sharpness along its length.

58. The file of claim 41 wherein said flute portion having at least one spiral cutting edge varying in relative sharpness along its length also varies in pitch along its length.

59. The file of claim 37 wherein said shank is fitted for driving in a handpiece.

60. An endodontic file for use in preparing a root canal

in a tooth, said file having a shank, a working portion and a tip, said file having a predetermined shape for forming a substantially tapered root canal from crown to apex of said root canal, said file comprising:

a file shank fitted for driving in a handpiece;

said file working portion being formed of nickel titanium alloy;

said file working portion taper being greater than ISO

Standard of 0.02 mm/mm of axial length; and

said file working portion having at least one helical cutting flute containing an edge which is shaped to provide a predetermined cross-sectional profile.

61. The file of claim 60 wherein said predetermined cross-sectional profile is linear.

62. The file of claim 60 wherein said predetermined cross-sectional profile is S-shaped.

63. The file of claim 60 wherein said at least one helical cutting flute varies in pitch along its length.

64. The file of the claim 63 wherein the ratio of flute pitch at any point along the flute portion to flute pitch at the tip diminishes linearly with distance from the shank along the flute portion.

65. The file of claim 60 wherein the edge of said at

least one helical cutting flute varies in sharpness along the file working portion.

66. The file of claim 65 wherein the degree of sharpness of said edge diminishes with distance from said shank along said working portion.

67. An endodontic file comprising:

a shank having a latch-grip for attachment to a dental handpiece;

5 a file working portion formed of nickel titanium alloy and having a taper greater than 0.02 mm/mm of axial length; and said working portion having at least one helical cutting flute forming a cutting edge having a predetermined cross-sectional profile.

68. The file of claim 58 wherein said predetermined cross-sectional profile is linear.

69. The file of claim 58 wherein said predetermined cross-sectional profile is S-shaped.

70. The set of files of claim 1 wherein the flute portion of each file includes a plurality of flutes, each provided with cutting edges about the periphery of the file, said cutting edges diminishing in diameter and sharpness and increasing in pitch with distance from the largest diameter flute.